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(54) Damper

(57) A damper (10) includes a housing (20) and a rotor (30). A portion (34) of the rotor (30) extends outwardly of the housing (20) and has a gear rotatably (66) disposed thereon. A coil spring (64) encircles the portion (34) of the rotor, and has an end segment (68) secured to the gear (60). Rotation of the gear (60) in one direction tightens the grip of the spring (64) on the rotor (30), and rotation of the gear (60) in the opposite direction loosens the grip of the spring (64) on the rotor (30). This provides a simple one-way operation of the damper.

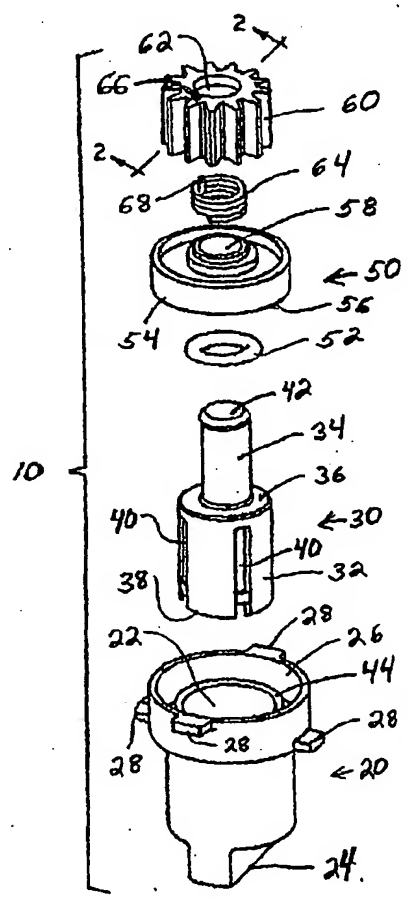

Fig. 1

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interconnects the damper gear and the rotor; and a device gear for operating a device, is drivingly engaged with the damper gear.

[0014] An advantage of the present invention is providing one-way damper that is selectively activated and deactivated in a simple and reliable manner.

[0015] Another advantage of the present invention is providing a clutch in a one-way damper that can be used with a one-piece rotor that is less susceptible to wear than previous designs using two-piece rotors.

[0016] A still further advantage of the present invention is providing a one-way damper that has less play than previous designs.

[0017] A still further advantage of the present invention is providing a compact damper with a spring clutch isolated from damper fluid.

[0018] Particular embodiments in accordance with this invention will now be described with reference to the accompanying drawings; in which:-

Fig. 1 is an exploded view of a damper in accordance with the present invention;

Fig. 2 is a cross-sectional view, in assembled form, of the damper shown in Fig. 1, taken on line 2-2 of Fig. 1;

Fig. 3 is a perspective view of the damper shown in the previous figures, installed for controlling the movement of a gear from a mechanism; and

Fig. 4 is an enlarged cross-sectional view, in assembled form, of a second, preferred embodiment of a damper in accordance with the present invention.

[0019] Referring now more specifically to the drawings, and to Fig. 1 in particular, numeral 10 designates a damper of the present invention, which can be used for controlling the movement of a device 12 (Fig.3), which maybe a drawer slide, a door closer or the like in furniture, automobiles or other devices. It is anticipated that damper 10 of the present invention will have a wide range of uses and applications, and should not be interpreted as being limited to the few used as examples herein. Device 12 includes a gear 14 drivingly engaged with damper 10.

[0020] Damper 10 includes a housing 20 defining a chamber 22 having a closed bottom 24 and an open top 26. One or more tabs or fixtures 28 can be provided on housing 20, to secure housing 20 as desired in device 12.

[0021] A rotor 30 is disposed partially within chamber 22, and is rotatable about its longitudinal axis. Rotor 30 includes a first portion 32 substantially contained within chamber 22, and a second portion 34 extending outwardly from housing 20. Rotation of rotor 30 in chamber 22 is retarded or inhibited by operation of a damping component in chamber 22. As those skilled in the art will understand readily, the damping component may include a damping fluid contained within chamber 22. First portion 32 is cooperatively shaped in association with chamber 22 to experience the desired damping effect to the rotation thereof from the resistance provided from the fluid or other damping component contained in chamber 22.

[0022] First portion 32 of rotor 30 is of greater diameter than is second portion 34, thereby defining a shoulder 36 at the transition from first portion 32 to second portion 34. First portion 32 fits closely within chamber 22, and may be of several configurations to achieve the desired damping effect. As shown, first portion 32 is cylindrical, with an open end 38 at the opposite end of first portion 32 from shoulder 36, and a plurality of slits or openings 40 extending along the length thereof. Second portion 34 is configured substantially as a stub shaft projecting from housing 20, in the assembled damper 10, and includes a distal end 42. Advantageously, rotor 30 is formed as a one-piece, monolithic structure including first portion 32 and second portion 34.

[0023] Shoulder 36 is associated with a ledge 44 in chamber 22 to function in cooperation with a seal 50 to isolate chamber 22, and any damping fluid therein, and prevent leaking of fluid from chamber 22. Seal 50 includes an O-ring seal 52 or other suitable seal on the periphery of second portion 34 of rotor 30, adjacent shoulder 36. A cap 54 is disposed on second portion 34, to close open top 26. Cap 54 includes a bottom 56 that seats on shoulder 36 and/or ledge 44, to provide a substantially fluid tight closure of open top 26. An opening 58 in bottom 56 allows cap 54 to be slid along second portion 34, from distal end 42 to shoulder 36. O-ring seal 52 effectively seals the area of second portion 34 adjacent bottom 56.

[0024] A damper gear 60 is provided at distal end 42 of second portion 34. Damper gear 60 has an axial aperture 62 there through of sufficient diameter such that damper gear 60 is somewhat loosely fitted on second portion 34. Damper gear 60 and rotor 30 can be rotated independently relative to each other. A mechanical link between damper gear 60 and rotor 30 is provided by a coil spring 64 disposed on second portion 34 and secured to damper gear 60. Spring 64 can be provided with a wax or other coating to provide corrosion resistance, reduce friction, and minimize noise. Aperture 62 includes an axial slot 66, and spring 64 has an end segment 68 that is secured in slot 66 so that spring 64 is thereby keyed to damper gear 60 and does not rotate within or relative to damper gear 60. A ring 70 (Fig. 3) provides an axial stop, such that damper gear 60 can not slide off distal end 42.

[0025] Coil spring 64 is somewhat snuggly fit on second portion 34, to grip the rotor more tightly as damper gear 60 is rotated in one direction, and to loosen the grip therebetween if damper gear 60 is rotated in the opposite direction.

[0026] At an inner face 72 of damper gear 60, a cavity 74 is formed substantially surrounding second portion 34 extending therethrough. A bottom 76 of cavity 74 is provided with aperture 62. Cavity 74 is of sufficient depth

(80) defines a channel (84), and said housing (86) has an inner rim (82) disposed in said channel (84).

7. A damper according to claim 5 or 6, wherein said cap (80) defines a collar (96), said collar (96) extending into a cavity (74) of said gear (60).

8. A damper according to claim 5, 6 or 7, wherein said cap (50,80) is sealed to said housing (20) by ultrasonic welding.

9. A damper according to any one of the of preceding claims, wherein said rotor (30) is monolithic.

10. A damper according to any one of the preceding claims, wherein said rotor (30) defines a hole (98) at an end thereof disposed in said housing (20), and said housing (20) has a post (100) disposed in said hole (98) in said rotor (30).

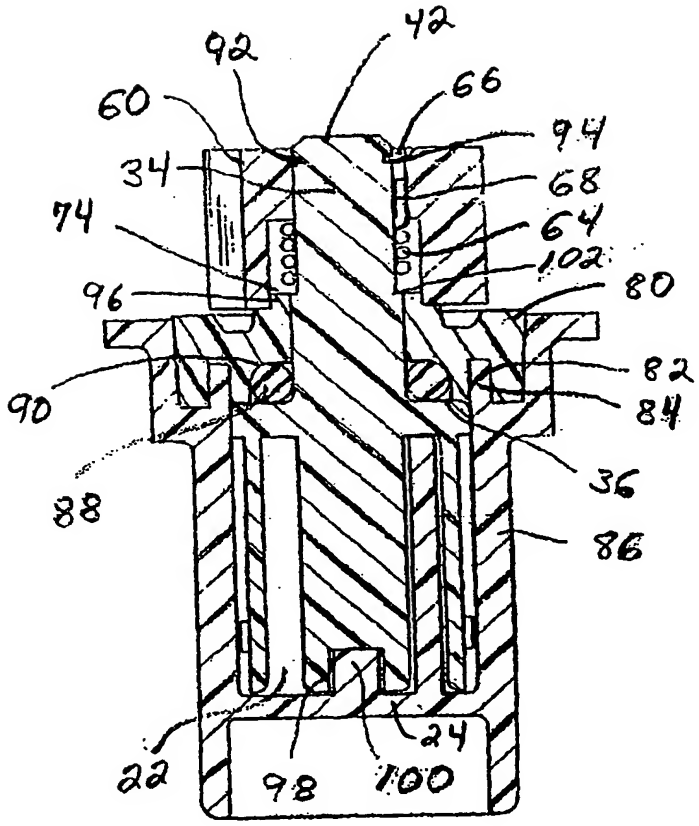

Fig. 4

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 25 3460

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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